

XXVII. *Observations made at Chislehurst, in Kent, in the Year 1774.* By the Rev. Francis Wollaston, LL.B: F.R.S.

Redde, Mar. 16, 1775. HAVING now compleated my original design, and kept my clock going for a third year, without the least touch of the oil, or any alteration whatsoever, I presume the result of my obser-vations to ascertain the rate of its going, may not be an unacceptable addition to the former papers on that sub-ject, delivered to this Society. The regular difference between the summer and winter months, and some degree of similiarity between those differences, seems to shew a regularity in the cause. What that may be, is not fully to be ascertained hereby; though it seems to have been difference of moisture, rather than of heat. By comparing these three last years with that which I first gave, when the clock was in some degree foul, it seems as if it were most affected when the work is clean. Yet is not that quite certain; for the differences, which de-creasing gradually in the following table, would justify this conclusion, it may be observed, increase again in the laft instance.

The

per Day. Diff.

The first greatest loss was	Dec. 1770 or - 1,9	" "
The next greatest gain	June 1771 + 2,4	4,3
The next greatest los	Oct. 1771 - 1,9	4,3

The clock was cleaned November 1771, and might not be reckoned to get to any stated rate till the beginning of the next year; after which,

Diff.

The first greatest loss was	Feb. 1772 or - 0,86	" "
The next greatest gain	July 1772 + 7,83	8,69
The next greatest loss	Jan. 1773 - 0,09	7,92
The next greatest gain	Aug. 1773 + 6,17	6,26
The next least gain	Feb. 1774 + 0,30	5,87
The next greatest gain	Aug. 1774 + 4,95	4,65
The next greatest los to the end of that year,	Dec. 1774 - 0,90	5,85

Hereby July and August appear to be the months for greatest acceleration, and January and February for retardation; contrary to the affection of metalline rods, but agreeable to the effect to be expected from moisture upon wood. Yet this difference is not so great in any degree, nor (what is more material to observation) by any means so sudden in its changes, as what is occasioned by heat upon metals. And even this, perhaps, might be obviated by a strong coat of varnish on the rod, or some preparation of the wood itself. One thing it may be proper to mention, as an accidental experience I have had the last year; that a clock so fixed, with

with a pendulum of so simple construction, is not easily affected by any tremulous motion of the building to which it is fastened. In the months of March, April, and part of May, I had occasion to make alterations in the top of my house, in order to gain more rooms in it; and notwithstanding the great jarring necessarily consequent upon taking off the old rafters, and laying on a new leaded roof, and new joists and floor over the observatory itself, the clock seems not to have been disordered at all by it. Between February 7th and 20th there will appear an error in the calculation of gain, to any one who shall take the trouble to examine it: not that I believe there is really any error in it; but by an accident in winding the clock (not having put down the spring sufficiently, which is intended to keep on the motion of the wheels,) there were 6" lost, as appeared by the assistant clock, which had been set with it just before. These 6" being allowed for, will reduce the loss of 2,1 to a gain of 3,9 in that interval of thirteen days,  $-2,1+6=+3,9$ . In the months of February, March, and April, I was frequently from home; so that the state of the thermometer and barometer, if I were to set them down, would be very imperfect. In the other months they are more compleat; yet there may, perhaps, in my absence, have been some days in them either higher or lower than what are here given.

	Clock + too fast. — too slow. for mean fol. time.	Numb. of Days.	Gain + or Loss —	Rate per Day.	Throwing out	
					South fide.	North fide.
1773.			"	"	° /	° /
Dec. 27	Clock + 32 19,7					
1774.						
Jan. 3	+ 32 26,9	7	+ 7,2	+ 1,03	I 25	I 28
Feb. 7	+ 32 41,7	35	+ 14,8	+ 0,42	I 27	I 29
	13 Loss in winding 6"	13	+ 3,9	+ 0,30	I 35	I 38
	+ 32 39,6	20	+ 6,0	+ 0,30	I 28	I 31
Mar. 12	+ 32 45,6	8	+ 2,4	+ 0,30	I 40	I 43
20	+ 32 48,0	13	+ 5,1	+ 0,39	I 35	I 40
April 2	+ 32 53,1	29	+ 52,0	+ 1,79	I 36	I 40
May 1	+ 33 45,1	25	+ 70,1	+ 2,80	I 40	I 43
26	+ 34 55,2	13	+ 45,4	+ 3,49	I 38	I 42
June 8	+ 35 40,6	14	+ 49,9	+ 3,57	I 36	I 40
22	+ 36 30,5	9	+ 37,3	+ 4,14	I 37	I 40
July 1	+ 37 7,8	31	+ 134,7	+ 4,34	I 32	I 35
August 1	+ 39 22,5	18	+ 86,9	+ 4,83	I 35	I 38
19	+ 40 49,4	15	+ 74,3	+ 4,95	I 32	I 35
Sept. 3	+ 42 3,7	9	+ 33,3	+ 4,70	I 35	I 38
12	+ 42 37,0	21	+ 68,3	+ 3,25	I 35	I 38
Oct. 3	+ 43 45,3	12	+ 23,9	+ 1,99	I 33	I 36
15	+ 44 9,2	14	+ 28,7	+ 2,05	I 30	I 33
29	+ 44 37,9	14	+ 29,8	+ 2,11	I 30	I 33
Nov. 12	+ 45 7,7	23	+ 19,4	+ 0,84		
Dec. 5	+ 45 27,1	8	— 1,7	— 0,21		
13	+ 45 25,4	11	— 6,9	— 0,63		
24	+ 45 18,5	8	— 7,2	— 0,90	I 20	I 23
1775.	Jan. 1	+ 45 11,3				

	Thermometer without doors exposed to the North.			Therm. near the clock.	Barometer on the ground floor.	Hygrom. near the clock.
	Hor. 8 A. M.	Hor. 2. P. M.	Hor. 11. P. M.	Hor. 9. A. M.		
1774.						
Jan.	Highest	48	50	48	47	29,85
	Lowest	23,5	29	23	31	28,67
May	Highest	60	67	53	57	29,98
	Lowest	45	45,5	40	47	29,10
June	Highest	70	74	60	65	30,11
	Lowest	51	55	47	51	29,24
July	Highest	72	82	60	65	30,14
	Lowest	57	57	50	53	29,52
August	Highest	70	76	63	65	30,12
	Lowest	57	61	50	53	29,32
Sept.	Highest	70	72	60	63	30,06
	Lowest	49	51	46	51	29,915
Oct.	Highest	56	64	54	55	30,37
	Lowest	39	45	39	44	29,23
Nov.	Highest	54	59	51	49	30,06
	Lowest	31,5	33	31	34	29,02
Dec.	Highest	50	53	51	45	30,54
	Lowest	21	30,5	25	30	28,95

Accidents of weather and various avocations have prevented me from making any other observations in the course of the last year; excepting the second disappearance of Saturn's ring, and re-appearance of it again, both of which I was fortunate enough to observe. I had seen the ring many times after its first re-appearance; and observed it to be lessening again, till it was become but a mere

a mere thread of light, Monday, April 4, though certainly visible then. Tuesday, April 5, the evening was very clear, yet no ring could I perceive with my  $3\frac{1}{2}$  feet achromatic telescope; nor from that time did I see any thing of it (but, during part of the interval, the appearance of a dark belt across the planet,) till Thursday, June 30, when I thought I saw the preceding *ansa*. Saturday, July 2, I am sure I saw the whole ring again, as a thread of light; and as the preceding *ansa*, or end of that thread, appeared larger than the subsequent one, it probably was visible, and not only a deception, when I fancied I perceived it before. In these observations it deserves to be remarked, that the magnifying power of 100 seemed, from its brightness, to shew the thread of the ring more visibly than 150.

Chislehurst,  
Jan. 1775.

FRANCIS WOLLASTON.